UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Pascal DEL GALLO, et al.
Application No.:	10/577,867
Filed:	May 8, 2007
Title:	Addition of (A) Blocking Agent(s) in a Ceramic Membrane for Clocking Crystalline Growth of Grains During Atmospheric Sintering
TC/A.U.:	1796
Examiner:	Khanh Tuan NGUYEN
Docket No.:	Serie 6356
Customer No.:	40582

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

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Sir:

This Brief is filed pursuant to the Notice of Appeal filed June 21, 2010.

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1. Real Parties In Interest

The real party in interest, L'AIR LIQUIDE, SOCIETE ANONYME A DIRCETOIRE ET CONSEIL DE SURVEILLANCE POUR L'ETUDE ET I'EXPLOITATION DES PROCEDES GEORGES CLAUDE, is the assignee of the entire title and interest in and to the subject application by virtue of an assignment recorded at the U.S. Patent and Trademark Office at: REEL/FRAME 019263/0933.

2. Related Appeals and Interferences

There are no related Appeals or Interferences.

3. Status of Claims

Claims 30-33, 35, 46, and 50 are on appeal. Each of these claims has been rejected. A complete copy of the current claims appears in the attached Appendix.

4. Status of Amendments

An After Final Amendment dated May 24, 2010 was entered by the Examiner.

5. Summary of the Claimed Subject Matter

Claim 30 is directe to a composite (M) comprising:

a) at least 75 vol% of a mixed electronic/oxygen O^{2-} anionic conducting compound (C_1) which, at the use temperature, are in the form of a crystal lattice having oxide ion vacancies, compound (C_1) being a perovskite compound of a formula selected from the group consisting of:

1) $La_{(1-x-u)}Sr_xAl_uFe_{(1-v)}Ti_vO_{3-\delta}$,

2) $La_{(1-x-u)}Sr_xAl_uFe_{(1-v)}Ga_v\ O_{3-\delta}$,

3) $La_{(1-x)}Sr_xFe_{(1-v)}Ti_vO_{3-\delta}$,

4) $La_{(1-x)}Sr_xTi_{(1-v)}Fe_v\ O_{3-\delta}$,

5) $La_{(1-x)}Sr_xFe_{(1-v)}Ga_vO_{3-\delta}$ or

6) $La_{(1-x)}Sr_xFeO_{3-\delta}$

where:

$0 < x \leq 0.5$;

$0 \leq u \leq 0.5$;

$(x + u) \leq 0.5$;

$0 \leq y \leq 0.9$;

$0 \leq v \leq 0.9$;

$0 \leq (y + v) \leq 0.9$; and

w is such that the structure in question is electrically neutral;

b) from at least 0.1 vol% but not more than 10 vol% of a compound (C_2) selected from the group consisting of magnesium oxide (MgO) and mixed barium titanium oxide ($BaTiO_3$); and

c) from 0 vol% to 2.5 vol% of a compound (C_3) produced from at least one chemical reaction represented by the equation:

$$xF_{C1} + yF_{C2} \rightarrow zF_{C3},$$

in which equation F_{C1}, F_{C2} and F_{C3} represent the respective crude formulae of compounds (C_1), (C_2) and (C_3) and x, y and z represent rational numbers greater than or equal to 0.

Claims 31-33, 35, 46, and 50 depend from claim 30 and thus include all of the limitations therein.

6. Grounds of Rejection to be Reviewed on Appeal:

The issues presented on Appeal are:

A. Whether claims 30-33, 35, 41-44, 46 and 50 are properly rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,624,542 (Shen) in view of U.S. Patent No. WO 2002/058830 (Chaput).

B. Whether claims 30-33, 35, 41-44, 46 and 50 are properly rejected under 35 U.S.C. § 103(a) as being unpatentable over WO 00/59613 (Mackay) in view of WO 2002/058830 (Chaput).

7. Arguments:

A) Claims 30-33, 35, 46 and 50 Are Not Taught By Shen And Chaput.

The rejection is improper because the teachings of Shen and Chaput combined in the manner suggested by the Examiner fail to disclose each and every limitation of the claims. In particular, the combination of Shen and Chaput fails to disclose, teach or suggest from at least 0.1 vol% but not more than 10 vol% of a compound (C_2) selected from the group consisting of magnesium oxide (MgO) and mixed barium titanium oxide ($BaTiO_3$).

In the Advisory Action, the Examiner takes the position that it would have been obvious to substitute the MgO doped $La_uSr_vFeO_w$ perovskite of Chaput for the $La_uSr_vCoO_w$ or $La_uSr_vFedCo_cOw$ perovskite of Shen. The Examiner equates a disclosure of MgO doped $La_uSr_vFeO_w$ perovskite of Chaput with a disclosure of a composite comprising:

- at least 75 vol% of a mixed electronic/oxygen O^{2-} anionic conducting compound (C_1) which, at the use temperature, are in the form of a crystal lattice having oxide ion vacancies, compound (C_1) being a perovskite compound of a formula $La_{(1-x)}Sr_xFeO_{3-\delta}$, and
- at least 0.1 vol% but not more than 10 vol% of a compound (C_2) of magnesium oxide (MgO).

As seen below, the Examiner has improperly construed the disclosure of Chaput.

Chaput does not disclose a composite of compounds C_1 and C_2. Rather, Chaput discloses a doped ceramic oxide in which the Magnesium and Oxygen atoms are incorporated into the ceramic oxide crystalline structure. The relevant portions of Chaput are Paragraphs [48] and [51]. Paragraph [48] of Chaput recites:

> *The solid electrolyte (DL) used in the ceramic membrane forming the subject-matter of the present invention is generally chosen from doped ceramic oxides that, at the operating temperature, are in the form of a crystal lattice with oxide ion vacancies. More particularly,*

they possess a fluorite structure and are preferably chosen from compounds of formula (I):

$$(M_\alpha O_\beta)_{1-x}(R_\gamma O_\delta)_x \qquad (I)$$

in which M represents at least one trivalent or tetravalent atom chosen from Bi, Ce, Zr, Ga, Th or Hf, δ and β are such that the structure $M_\alpha O_\beta$ is electrically neutral, R represents at least one divalent or trivalent atom chosen from Mg, Ca, Ba, Sr, Gd, Sc, Yb, Y, Sm or La, γ and δ are such that the structure $R_\gamma O_\delta$ is electrically neutral and x is generally between 0.05 and 0.30 and more particularly between 0.075 and 0.15.

Paragraph [51] of Chaput recites:

"As ceramic oxides of formula $M_\alpha O_\beta$, there are mainly zirconium oxide ($Zr0_2$), cerium oxide ($Ce0_2$), hafnium oxide ($Hf0_2$), thorium oxide ($Th0_2$), gallium oxide (Ga_20_3) or bismuth oxide (Bi_20_3). These oxides are doped with one or more oxides chosen generally from magnesium oxide (MgO)".

The teachings of Chaput taken as a whole clearly would have led the skilled artisan to conclude that the Magnesium and Oxygen atoms of the MgO dopant are actually incorporated into the $(M_\alpha O_\beta)_{1-x}(R_\gamma O_\delta)_x$ ceramic oxide crystalline structure. Such a doped ceramic oxide is wholly distinguishable from a composite of a $La_{(1-x)}Sr_xFeO_{3-\delta}$ perovskite and MgO.

Thus, the combination of Shen and Chaput teachings fails to disclose, teach or suggest each of the claim limitations.

B) Claims 30-33, 35, 46 and 50 Are Not Taught By Mackay And Chaput.

The rejection is improper because the teachings of Mackay and Chaput combined in the manner suggested by the Examiner fail to disclose each and every limitation of the claims. In particular, the combination of Mackay and Chaput fails to disclose, teach or suggest from at least 0.1 vol% but not more than 10 vol%

of a compound (C_2) selected from the group consisting of magnesium oxide (MgO) and mixed barium titanium oxide ($BaTiO_3$).

In the Advisory Action, the Examiner takes the position that it would have been obvious to substitute the MgO doped $La_uSr_vFeO_w$ perovskite of Chaput for the brown-millerite of Mackay. The Examiner equates a disclosure of MgO doped $La_uSr_vFeO_w$ perovskite of Chaput with a disclosure of a composite comprising:

- at least 75 vol% of a mixed electronic/oxygen O^{2-} anionic conducting compound (C_1) which, at the use temperature, are in the form of a crystal lattice having oxide ion vacancies, compound (C_1) being a perovskite compound of a formula $La_{(1-x)}Sr_xFeO_{3-\delta}$, and
- at least 0.1 vol% but not more than 10 vol% of a compound (C_2) of magnesium oxide (MgO).

As seen below, the Examiner has improperly construed the disclosure of Chaput.

Chaput does not disclose a composite of compounds C_1 and C_2. Rather, Chaput discloses a doped ceramic oxide in which the Magnesium and Oxide atoms are incorporated into the ceramic oxide crystalline structure. The relevant portions of Chaput are Paragraphs [48] and [51]. Paragraph [48] of Chaput recites:

> *The solid electrolyte (DL) used in the ceramic membrane forming the subject-matter of the present invention is generally chosen from doped ceramic oxides that, at the operating temperature, are in the form of a crystal lattice with oxide ion vacancies. More particularly, they possess a fluorite structure and are preferably chosen from compounds of formula (I):*
>
> $$(M_\alpha O_\beta)_{1-x}(R_\gamma O_\delta)_x \qquad (I)$$
>
> *in which M represents at least one trivalent or tetravalent atom chosen from Bi, Ce, Zr, Ga, Th or Hf, δ and β are such that the structure $M_\alpha O_\beta$ is electrically neutral, R represents at least one divalent or trivalent atom chosen from Mg, Ca, Ba, Sr, Gd, Sc, Yb, Y, Sm or La, γ and δ are such that the structure $R_\gamma O_\delta$ is electrically*

neutral and x is generally between 0.05 and 0.30 and more particularly between 0.075 and 0.15.

Paragraph [51] of Chaput recites:

"As ceramic oxides of formula $M_\alpha O_\beta$, there are mainly zirconium oxide ($Zr0_2$), cerium oxide ($Ce0_2$), hafnium oxide ($Hf0_2$), thorium oxide ($Th0_2$), gallium oxide (Ga_20_3) or bismuth oxide (Bi_20_3). These oxides are doped with one or more oxides chosen generally from magnesium oxide (MgO)".

The teachings of Chaput taken as a whole clearly would have led the skilled artisan to conclude that the Magnesium and Oxygen atoms of the MgO dopant are actually incorporated into the $(M_\alpha O_\beta)_{1-x}(R_\gamma O_\delta)_x$ ceramic oxide crystalline structure. Such a doped ceramic oxide is mutually distinguishable from a composite of a $La_{(1-x)}Sr_xFeO_{3-\delta}$ perovskite and MgO.

Thus, the combination of Mackay and Chaput teachings fails to disclose, teach or suggest each of the claim limitations.

CONCLUSION

The Examiner errs in finding that:

A. Claims 30-33, 35, 46, and 50 are unpatentable under 35 U.S.C. § 103(a) over U.S. Patent 5,624,542 (Shen) in view of U.S. Patent No. WO 2002/058830 (Chaput).

B. Claim 24 is unpatentable under 35 U.S.C. § 103(a) over WO 00/59613 (Mackay) in view of WO 2002/058830 (Chaput).

Reversal of the Examiner is respectfully requested.

Respectfully submitted,

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8. Claims Appendix

1-29 (Cancelled)

30. (previously presented) A composite (M) comprising:

a) at least 75 vol% of a mixed electronic/oxygen O^{2-} anionic conducting compound (C_1) which, at the use temperature, are in the form of a crystal lattice having oxide ion vacancies, compound (C_1) being a perovskite compound of a formula selected from the group consisting of:

1) $La_{(1-x-u)}Sr_xAl_uFe_{(1-v)}Ti_vO_{3-\delta}$,

2) $La_{(1-x-u)}Sr_xAl_uFe_{(1-v)}Ga_v\ O_{3-\delta}$,

3) $La_{(1-x)}Sr_xFe_{(1-v)}Ti_vO_{3-\delta}$,

4) $La_{(1-x)}Sr_xTi_{(1-v)}Fe_v\ O_{3-\delta}$,

5) $La_{(1-x)}Sr_xFe_{(1-v)}Ga_vO_{3-\delta}$ or

6) $La_{(1-x)}Sr_xFeO_{3-\delta}$

where:

$0 < x \leq 0.5$;

$0 \leq u \leq 0.5$;

$(x + u) \leq 0.5$;

$0 \leq y \leq 0.9$;

$0 \leq v \leq 0.9$;

$0 \leq (y + v) \leq 0.9$; and

w is such that the structure in question is electrically neutral;

b) from at least 0.1 vol% but not more than 10 vol% of a compound (C_2) selected from the group consisting of magnesium oxide (MgO) and mixed barium titanium oxide ($BaTiO_3$); and

c) from 0 vol% to 2.5 vol% of a compound (C_3) produced from at least one chemical reaction represented by the equation:

$$xF_{C1} + yF_{C2} \rightarrow zF_{C3},$$

in which equation F_{C1}, F_{C2} and F_{C3} represent the respective crude formulae of compounds (C_1), (C_2) and (C_3) and x, y and z represent rational numbers greater than or equal to 0.

31. (previously presented) The composite of claim 30, in which grains of compound (C_2) have an equiaxed shape with a diameter ranging from 0.1 μm to 5 μm.

32. (previously presented) The composite of claim 30, in which the volume fraction of compound (C_3) does not exceed 1.5%.

33. (Previously presented) The composite of claim 32, in which the volume fraction of compound (C_3) in the composite tends toward 0.

34. (canceled)

35. (currently amended) The composite of claim ~~34~~ 30, in which the volume fraction of compound (C_2) does not exceed 5%.

36. (canceled)

37. (canceled)

38. (canceled)

39. (canceled)

40. (canceled)

41. (canceled)

42. (canceled)

43. (canceled)

44. (canceled)

45. (canceled)

46. (previously presented) The composite of claim 30, of formula:

a) $La_{0.6}\ Sr_{0.4}\ Fe_{0.9}\ Ga_{0.1}\ O_{3-\delta}$, or

b) $La_{0.5}\ Sr_{0.5}\ Fe_{0.9}\ Ti_{0.1}\ O_{3-\delta}$.

47. (canceled)

48. (canceled)

49. (canceled)

50. (previously presented) The composite of claim 30, wherein compound (C_2) is MgO.

9. Evidence Appendix

None.

10. Related Proceedings Appendix

None.